1   Information Retrieval and Display System
2
3   Inventor:
4   Alan E. Swahn
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6
7   FIELD OF THE INVENTION
8
9   This invention, hereinafter referred to as "IRDS" relates to

10   (i) Information Retrieval and Display Systems in a networked communications

11   environment;

12   (ii) the operation of web browsers; and

13   (iii) the operation of search engines.

14   The networked communications environment ("Network") may include Wide Area

15   Networks (WANs), Metropolitan Area Networks (MANs), Local Area Networks (LANs),

16   wired and wireless systems that permit multiple computers to communicate utilizing a set

17   of protocols, such as Transmission Control Protocol/Internet Protocol (TCP/IP) and

18   Hypertext Transfer Protocol (HTTP), in an Internet, Intranet, or Extranet environment.

19

20   CROSS REFERENCE TO RELATED APPLICATIONS AND DISCLOSURES

21

22   This application claims the benefit of U.S. Provisional Application, Application Number

23   60/409,456, filed on September 10, 2002, and entitled "Information retrieval and display

24   system", commonly assigned with the present invention and incorporated herein by

25   reference.

26

27   BACKGROUND

28

29   Web browsers include but are not limited to Internet Explorer, Netscape Navigator,

30   Mozilla, Opera, Konqueror, and Galeon. Web browsers are the standard for viewing

31   website information. Web browsers have differentiated themselves by computer

32   operating system support (such as Apple, Microsoft Windows, and Unix), webpage

33   download speed, computer memory usage, and compliance to standards. Most web

1 browsers are also capable of uploading and downloading files, but this competes with

2 well-established file transfer protocol (FTP) programs in this particular arena. Some web

3 browsers have the capability to call other programs depending on context, such as

4 opening a media player to play a music file, after downloading the music file from a

5 Network. Called programs may permanently reside on a local computer's physical media,

6 but may sometimes be (i) loaded across a Network and executed locally or (ii) executed

7 on a different computer.

8

9 Some web browsers have a loosely integrated search capability, such as Microsoft's

10 Internet Explorer. The user may enter the search topic and constraints into the web

11 browser display and subsequently execute a search. The web browser calls a search

12 engine across a Network to execute a search on a different computer and displays the

13 resulting hyperlinks to webpages in a prioritized order on the local computer. A list of

14 text hyperlinks, that may have an associated description in the vicinity of the hyperlink, is

15 usually displayed in one panel of the web browser. A second panel sometimes holds

16 static images with hyperlinks that may have

17   (i) an associated text hyperlink repeated in the vicinity of each image; and/or

18   (ii) an associated description in the vicinity of each image.

19 These images, when present, are simple thumbnail images with hyperlinks to an

20 associated webpage. The thumbnail images are very small and tiled in the panel. Their

21 small size makes it difficult to obtain much useful information from the picture alone.

22 US patent number 6,271,840 B1 dated August 7, 2001 to inventors James Lee Finseth

23 and Jerry Hermel and Bryan F. Pelz entitled "Graphical Search Engine Visual Index"

24 describes a visual index method that provides graphical output from search engine results

25 or other URL lists. The graphical information and other media information is rendered

26 into a reduced graphical form for review by a user. The reduced graphical form is

27 sometimes useful for discerning graphical and/or textual information when not much

28 detail is required, but it is difficult to use a reduced graphical form when detailed

29 graphical and/or textual information is required, similar to the thumbnail images

30 described in the foregoing.

31

1   Web browsers that don't have a loosely integrated search function, rely on search engine

2   websites to provide the user interface to perform a search. Search engine websites

3   generally display their results in one main viewing area of a web browser, and optionally

4   display a list of

5   (i) text hyperlinks; or

6   (ii) static images with hyperlinks that may have the associated text hyperlink

7   repeated in the vicinity of each image and an associated description in the vicinity

8   of each image.

9   Again, these images, when present, are simple thumbnail images with hyperlinks to an

10   associated website. As this method is web browser independent and has been available

11   for many years, it is the most widely used search technique.

12

13   Web browsers have the ability to display a webpage that contains information from

14   multiple sources on a Network. A webpage points to such information through

15   hyperlinks, designated Uniform Resource Identifiers (URIs) or informally as Uniform

16   Resource Locators (URLs). URIs are short strings that identify resources on a Network,

17   including but not limited to documents, images, services, downloadable files, webpages,

18   and electronic mailboxes. When loading a webpage, a web browser uses the URIs to

19   locate, load and display information residing on a Network. In some cases, the web

20   browser may take additional actions, such as asking for a username/password or loading

21   another program(s) to interpret the information.

22

23   The information from these multiple Network sources can be divided up into independent

24   web browser viewing areas, called Frames. Frames are usually used to manage

25   complexity and information from a particular website. A common use for Frames is to

26   divide the web browser viewing area into categories of information, such as keeping the

27   menu system in one area, advertisements in a second area, and main website content in a

28   third area. Not all websites use Frames and not all web browsers support Frames. It is

29   possible to subjugate multiple websites and their respective webpages within a website's

30   webpage(s). Such subjugation is usually done when the information is closely related

31   between such websites and/or a relationship exists between the website owners.

1

2 Even though a website may subjugate another related website's webpages through

3 mechanisms such as Frames discussed in the foregoing, web browsers do not generally

4 display and operate on multiple independent websites at one time. Information related to

5 a particular search topic, may be scattered on multiple independent websites. Web

6 browsers and search engines, do not coalesce pertinent webpages, as opposed to

7 hyperlinks, and simultaneously display multiple webpages. This inability greatly impedes

8 information search, retrieval, and viewing processes given current levels of processor

9 power and Internet connection bandwidth. To display and/or operate on more than one

10 webpage at a time and have the search capabilities that users have become accustomed to

11 would require enhancements to the web browser and tight integration of the web browser

12 and search engine control functions—something that has not been done to date.

13

14 Every website has its own latency in responding to a web browser, such that the web

15 browser can download the webpage and render the webpage in the display. Hence the

16 time to review multiple website webpages includes each website's response time, the

17 Network latency at a given time, and the time to select the next hyperlink (collectively

18 "Latency"). Web browsers are currently limited to downloading only one webpage at a

19 time. Even with simultaneous multiple Network connections to such a webpage, the

20 Latency to review multiple webpages or websites is additive and arbitrarily limited by the

21 webpages that, for whatever reason, are slow to retrieve. US patent number 6,067,565

22 dated May 23, 2000 to inventor Eric Horvitz entitled "Technique For Prefetching A Web

23 Page Of Potential Future Interest In Lieu Of Continuing A Current Information

24 Download" describes prefetching webpages or pre-selected portions thereof, into a local

25 cache of a client computer. This prefetching technique uses a probabilistic user model,

26 which specifies, at any one time, those pages or portions of pages that are likely to be

27 prefetched given, e.g., a webpage currently being rendered to a user; these pages being

28 those which promise to provide the largest benefit (expected utility) to the user. This

29 approach has little utility when used in conjunction with a conventional search engine,

30 where a user gives search criteria to a search engine and such search engine returns a

31 ranked ordered hyperlink list corresponding to webpages based on the user's criteria. The

1   search engine has already calculated the rank order for the hyperlinks before returning

2   said hyperlink list to the user's web browser. It is unnecessary to further apply a

3   probabilistic or statistical user model to said web page containing said hyperlink list, as

4   the hyperlink list is already ranked ordered. A preloading scheme that preloaded the

5   ranked ordered hyperlinks directly into a web browser for later display would have much

6   greater utility to lower the latency to review such webpages and more efficiently use the

7   associated network and computer resources. Similarly, US patent number 6,085,226

8   dated July 4, 2000 to inventor Eric Horvitz entitled "Method And Apparatus For Utility-

9   Directed Prefetching Of Web Pages Into A Local Cache Using Continual Computation

10   And User Models" describes prefetching webpages or pre-selected portions thereof, into

11   a local cache of a client computer. This prefetching technique uses a probabilistic user

12   model to specify, at any one time, those pages or portions of pages, that are likely to be

13   prefetched given, e.g., a webpage currently being rendered to a user, which promises to

14   provide the largest benefit (expected utility) to the user. Again, this approach has little

15   utility when used in conjunction with a conventional search engine, where a user gives

16   search criteria to a search engine and such search engine returns a ranked ordered

17   hyperlink list corresponding to webpages based on the user's criteria. The search engine

18   has already calculated the rank order for the hyperlinks before returning said hyperlink

19   list to the user's web browser. It is unnecessary to further apply a probabilistic or

20   statistical user model to said web page containing said hyperlink list, as the hyperlink list

21   is already ranked ordered. A preloading scheme that preloaded the ranked ordered

22   hyperlinks directly into a web browser for later display would have much greater utility

23   to lower the latency to review such webpages and more efficiently use the associated

24   network and computer resources. Similarly, US patent number 6,182,133 B1 dated

25   January 30, 2001 to inventor Eric Horvitz entitled "Method And Apparatus For Display

26   Of Information Prefetching And Cache Status Having Variable Visual Indication Based

27   On A Period Of Time Since Prefetching" describes prefetching webpages or portions

28   thereof and subsequently making a visual indication to a user that such pages or portions

29   have been prefetched. This prefetching technique uses a probabilistic or statistical user

30   model to specify, at any one time, those pages that are to be prefetched given

31   information, e.g., a webpage currently being rendered to a user, content and structure of

1   that particular page, a history of webpages visited by the user, user background, and user

2   actions. Again, this approach has little utility when used in conjunction with a

3   conventional search engine, where a user gives search criteria to a search engine and such

4   search engine returns a ranked ordered hyperlink list corresponding to webpages based on

5   the user's criteria. The search engine has already calculated the rank order for the

6   hyperlinks before returning said hyperlink list to the user's web browser. It is

7   unnecessary to further apply a probabilistic or statistical user model to said web page

8   containing said hyperlink list, as the hyperlink list is already ranked ordered. A

9   preloading scheme that preloaded the ranked ordered hyperlinks directly into a web

10   browser for later display would have much greater utility to lower the latency to review

11   such webpages and more efficiently use the associated network and computer resources.

12

13   In reviewing webpage information, it is often difficult to copy and paste information

14   accurately into other applications or even print such information. The capability to select

15   any portion of the web browser display and generate an image in a selected format that

16   can be saved to a physical media such as hard drive, floppy drive, compact disk or

17   computer memory—such as the Microsoft Windows clipboard, is not incorporated in web

18   browsers today.

19

20   Websites frequently have webpages that include fonts and images that are small and

21   difficult to read. Web browsers don't have a zoom capability to enlarge a viewing area or

22   make it smaller, thereby rendering such information that may be too small or too large

23   useless, if it can't be dynamically enlarged or made smaller respectively.

24

25   Web browsers have very limited functionality to enhance the viewing and processing of

26   information, but do usually include the capability to

27   (i) list and select hyperlinks to webpages associated with the history of the

28   websites previously visited; and

29   (ii) select and save favorite hyperlinks to website webpages, one at a time. Web

30   browsers don't have the capability to remove or prune one or more hyperlinks

1   from a hyperlink list returned by a search engine(s) or save, for future retrieval, a

2   complete hyperlink list or pruned hyperlink list returned by a search engine(s).

3   There also isn't a capability to save a hyperlink list or pruned hyperlink list to an alternate

4   list or queue for later review or saving, while possibly continuing on with a new search

5   that may entail different subject matter, options, constraints, or search engine(s).

6

7   Common search engines include, but are not limited to Google, Yahoo!, AltaVista,

8   Lycos, Webcrawler, Excite, Northern Light, MSN Search, iWon, HotBot, AlltheWeb,

9   Teoma, DMOZ, DOGPILE, WizeNut, Overture, AOL, Ask Jeeves, Inktomi, LookSmart,

10   and Netscape. Search engines differentiate themselves mainly on content and features.

11   The size of the search engine database is one of the content metrics. Search engines may

12   return lists of hyperlinks that specialize in a content area such as: news, music files,

13   auctions, employment, insurance, loans, yellow pages, white pages, email addresses,

14   sports, shopping, movies, classifieds, health, images, movies, home life, finance, stocks,

15   and travel. Search features may include: language selection, word exclusion, exact

16   phrases to be returned, number of pages to be returned, file format, returning results from

17   a specific website domain, and content blocks. Some search engines are website domain

18   specific such as Dell, GM, and Sears and are accessed from their respective websites.

19   Conventional search engines return one or more lists of text hyperlinks and/or images

20   with hyperlinks, not the fully active webpages associated with the hyperlinks.

21

22   Utilizing a search engine website is a serial process of browsing to such website; entering

23   the search topic, options and constraints; executing the search; a list of hyperlinks

24   (usually a set of ten (10) at one time) is returned by the search engine and displayed by

25   the web browser; selecting a single hyperlink from the list; being vectored to the

26   associated website; reviewing the webpage information that resides on the website in the

27   web browser; and returning to the search engine website to select another hyperlink. This

28   process is repeated for each such successive hyperlink. To view the next set (usually ten)

29   of hyperlinks requires selecting yet a different hyperlink to render the next set of

30   hyperlinks in the web browser. This laborious ping-pong process between websites and

1   the search engine hyperlink list is continued until the sought after information is found or

2   the search is terminated.

3

4   There are multiple inherent problems in using a prior art web browser—search engine

5   paradigm for information retrieval and display, stemming from an age where Network

6   and Internet bandwidth was limited and costly. Better solutions are needed that remove

7   the foregoing web browser and search engine deficiencies, given the greater processor

8   power measured in millions of instructions per second (MIPS) and Internet access

9   bandwidth measured in millions of bits per second (Mbits/sec.) available today, while

10   providing a tighter integration between the web browser and search engine(s).

11

12

1 SUMMARY

2

3 IRDS enhancements are described that enable search, display, and review of Network

4 based information to become a fast efficient process. An IRDS based solution includes

5 web browser enhancements and enhancements only achieved in combination with a

6 search engine and web browser.

7

8 An embodiment of IRDS may include, but is not limited to: a stand-alone computer

9 application program; integration into a web browser; or an add-on to a conventional web

10 browser such as, Microsoft's Internet Explorer and Netscape's Navigator. An add-on may

11 take the form of

12   (i) an applet;

13   (ii) a web browser plugin; or

14   (iii) a computer program that interfaces to a web browser through an application-

15   programming interface (API) or proprietary interface.

16

17 IRDS enhancements to a web browser in combination with one or more search engines

18 permits the search topic, options and constraints to be sent to one or more search engines

19 without browsing to the search engine website(s). Each search engine has its own limited

20 grammar that controls each search, which can be sent to a search engine across a

21 Network. For example, searching for classic cars with webpages in German or Polish and

22 requesting fifty (50) pages to be returned, starting with the twenty-first webpage utilizing

23 the Google search engine, would entail sending the search engine a string of information

24 in a grammar that it recognizes such as:

25

26   "http://www.google.com/search?q=classic+cars&num=50&hl=en&lr=lang_de||lan

27   g_pl&ie=UTF-8&oe=UTF-8&start=20&sa=N".

28

29 Here the "q=classic+cars" represents the search topic "classic cars", with the languages

30 German or Polish specified by "lr=lang_de||lang_pl", and the starting webpage of twenty-

31 one is specified by "start=20" and fifty pages to be returned are specified by "num=50".

1　This string could be typed into a web browser with the resulting hyperlink list directly

2　displayed in a web browser without browsing to the search engine website first. This

3　string of information could also be sent from an IRDS enhanced web browser, where

4　search topic, options and constraints are entered and/or selected by the user. Such an

5　enhanced web browser dynamically builds the string in the correct grammar for one or

6　more search engines and passes the string to each selected search engine through the

7　Network. Each search engine processes the request and returns a webpage that contains a

8　list of hyperlinks and/or images with hyperlinks. These webpages when communicated

9　back to the enhanced web browser are in a binary format representing text. This format

10　can be used to reconstruct a list of hyperlinks. The lists of hyperlinks returned from one

11　or more search engines can be aggregated and/or prioritized by such web browser. The

12　enhanced web browser may then use the hyperlinks to preload a number of the associated

13　webpages concurrently ("Concurrent Webpage Preloading") and display a selected

14　number for review. The webpages may be from the same website domain and /or

15　differing website domains. The selectable number of webpages to load concurrently will

16　depend on the Network bandwidth, how much computer memory is available, and to a

17　smaller degree, computer- processing power.

18

19　Other fields could also use the concept of Concurrent Webpage Preloading to enhance

20　performance, such as web robots. Computer programs called by various names including

21　web robots and spiders, capture data that database centric programs like search engines

22　and bulk email programs utilize. These robots scour the web for data by contacting

23　website webpages and cataloging information such as a website description, title, email

24　addresses, and/or keywords. By using Concurrent Webpage Preloading these robots

25　would be able to contact and catalog many website webpages at the same time. This

26　would enable better use of available Network bandwidth and reduce the time to visit

27　target websites and update an ongoing catalog.

28

29　In addition to Concurrent Webpage Preloading, one or more look-ahead webpage

30　preloading mechanisms can be provided for the remaining unloaded webpages, to ensure

1   a near instantaneous webpage review experience. Such mechanisms can include a look-

2   ahead

3   (i) next-in-queue webpage preloading method ("Next-In-Queue Webpage

4   Preloading");

5   (ii) periodic webpage preloading method ("Periodic Webpage Preloading");

6   and/or

7   (iii) descendant webpage preloading method ("Descendant Webpage

8   Preloading").

9

10   Next-In-Queue Webpage Preloading refers to a method that preloads a selectable number

11   of webpages pointed to by hyperlinks in a hyperlink queue that haven't been previously

12   preloaded by other methods including Concurrent Webpage Preloading, Periodic

13   Webpage Preloading, and Descendant Webpage Preloading. While one or more

14   webpages are being displayed in a web browser, these webpages can be preloaded and

15   subsequently displayed in a web browser on demand.

16

17   Periodic Webpage Preloading refers to a method whereby the webpage queue is scanned

18   periodically for unloaded webpages. Upon finding empty locations, one or more

19   webpages are preloaded into a webpage queue, which may then be subsequently

20   displayed in a web browser on demand. Unloaded webpages may be selectively

21   preloaded depending on which webpages are currently displayed, user preferences and/or

22   other criteria, hence the preloading order is not required to be sequential.

23

24   Parent webpages referred to by a list or set of hyperlinks may contain hyperlinks that

25   point to other children webpages, which in turn may contain hyperlinks that point to other

26   webpages (grandchildren of the parent webpages), in perpetuity, collectively referred to

27   as "Descendants". Descendant Webpage Preloading refers to a method that preloads

28   selected Descendants. Any such Descendants would be visible in a web browser on

29   demand. A selectable limit on the number of Descendants or generation of Descendants

30   to preload may be provided, as the number of possible webpages to preload rises quickly

31   with each additional parent webpage.

1 Other IRDS enhancements that improve a web browser in a search and multiple webpage

2 display context include

3   (i) finding and highlighting the search topic within one or more displayed

4   webpages;

5   (ii) bookmarking selected webpages or all the webpages as a list of hyperlinks

6   that can be later recalled and used to preload the associated webpages into a

7   webpage queue for web browser display on demand;

8   (iii) deleting selected webpages in a list, queue, or web browser history thereby

9   pruning the list or set of webpages;

10   (iv) saving any or all of the webpages in a webpage queue to an alternate webpage

11   set or queue for recall at a later time, while allowing a new search to commence

12   that may entail different subject matter, constraints, or search engines; and

13   (v) displaying search statistics, the webpage index being viewed, highest webpage

14   index preloaded, Network bandwidth, memory usage, and/or processor usage

15   statistics.

16 IRDS enhancements to a web browser enable

17   (i) a web browser to display one or more fully active webpages simultaneously;

18   (ii) a web browser individual operation on any webpage or simultaneous

19   operation on multiple webpages;

20   (iii) zoom in or out on any displayed webpage or webpages;

21   (iv) changing the number of webpages displayed;

22   (v) displaying the next webpage or next set of webpages depending on the number

23   of webpages being displayed at a given time;

24   (vi) displaying any selected webpage or any set of webpages depending on the

25   number of pages displayed at a given time; and

26   (vii) creating an image of any portion of the web browser display screen on

27   demand and saving it to selected media or computer memory.

28 IRDS enhancements capitalize on the availability of

29   (i) high bandwidth networks, such as broadband cable networks rated at up to 1.5

30   Mbits/sec. and Digital Subscriber Line (DSL) networks rated at up to 1.5

31   Mbits/sec.;

1   (ii) multithreaded computer architectures;

2   (iii) large inexpensive computer memory storage; and

3   (iv) fast computer instruction processing, such as the Intel Pentium 4 rated at

4   ~1700 MIPS for a clock speed of 1.5 GHz.

5

6   BRIEF DESCRIPTION OF THE DRAWINGS

7

8   The present invention is described with respect to particular exemplary embodiments

9   thereof and reference is accordingly made to the drawings in which:

10

11   Figure 1 shows a distributed Network environment for a conventional information search,

12   utilizing a web browser on a computer and a search engine.

13

14   Figure 2 shows a conventional search engine display in a web browser with command

15   and control, a list of text hyperlinks returned from a search and optional value-add

16   information.

17

18   Figure 3 shows a conventional search engine display in a web browser with command

19   and control, a list of thumbnail images with hyperlinks returned from a search and

20   optional value-add information.

21

22   Figure 4 shows a flowchart of a conventional information acquisition and review cycle

23   for a search performed with a web browser and search engine.

24

25   Figure 5 shows a conventional web browser incorporating a loosely integrated search

26   function with command and control, a list of text hyperlinks, a list of images with

27   hyperlinks returned from a search, and optional value-add information.

28

29   Figure 6 shows a flowchart of a conventional information acquisition and review cycle

30   for a search performed with a web browser incorporating a loosely integrated search

31   function.

1

2 Figure 7 shows a flowchart of a conventional web browser serial webpage loading cycle,

3 after a web browser has requested a new webpage from a website or other Network

4 resource.

5

6 Figure 8 shows possible levels of IRDS integration with a conventional web browser in a

7 Networked environment.

8

9 Figure 9 shows an IRDS command, control, status panel and a single (1) fully active

10 webpage displayed.

11

12 Figure 10 shows an IRDS command, control, status panel, and two (2) fully active

13 webpages displayed.

14

15 Figure 11 shows an IRDS command, control, status panel, and four (4) fully active

16 webpages displayed.

17

18 Figure 12 shows the IRDS command, control, status panel and nine (9) fully active

19 webpages displayed.

20

21 Figure 13 shows a flowchart of an IRDS based information acquisition and review cycle.

22

23 Figure 14 shows an IRDS directed, web browser concurrent multiple webpage preloading

24 from one or more websites, after a search has been initiated.

25

26 Figure 15 shows a flowchart that describes an IRDS directed, web browser look-ahead

27 Next-In-Queue Webpage Preloading function, where when a request is made to view the

28 next group of webpages, the group of webpages immediately following this next group of

29 webpages pointed to by the associated hyperlinks in the hyperlink queue are preloaded

30 into a webpage queue. These webpages are not visible, but are immediately available to

31 become visible and viewed upon demand.

1

2 Figure 16 shows a flowchart that describes an IRDS directed, web browser look-ahead

3 Periodic Webpage Preloading function. After a webpage is loaded into the web browser

4 display, the associated hyperlink in the hyperlink queue is marked as loaded. The

5 Periodic Webpage Preloading function scans the hyperlink queue for hyperlinks not

6 marked as loaded and directs the web browser to preload one or more webpages into a

7 webpage queue pointed to by such unmarked hyperlinks. These webpages are not visible,

8 but are immediately available to become visible and viewed upon demand. After

9 directing the web browser to preload such webpages, the unmarked hyperlinks are

10 marked as loaded and the function waits a specified period of time before rescanning the

11 hyperlink queue and repeating the process.

12

13 Figure 17 shows a flowchart that describes an IRDS directed, web browser look-ahead

14 Periodic Webpage Preloading function with webpage loading collision avoidance. After a

15 webpage is loaded into the web browser display, the associated hyperlink in the hyperlink

16 queue is marked as loaded. The Periodic Webpage Preloading function scans the

17 hyperlink queue for hyperlinks not marked as loaded and directs the web browser to

18 preload one or more webpages into a webpage queue pointed to by such unmarked

19 hyperlinks, if such webpages are not already in the process of being loaded by a different

20 type of look-ahead function, such as described in Figure 15 and Figure 19. These

21 webpages are not visible, but are immediately available to become visible and viewed

22 upon demand. After directing the web browser to preload such webpages, the unmarked

23 hyperlinks are marked as loaded and the function waits a specified period of time before

24 rescanning the hyperlink queue and repeating the process.

25

26 Figure 18 shows a flowchart that describes an IRDS directed, web browser look-ahead

27 Periodic Webpage Preloading function with webpage loading collision avoidance and

28 Network and processor saturation avoidance. After a webpage is loaded into the web

29 browser display, the associated hyperlink in the hyperlink queue is marked as loaded. The

30 Periodic Webpage Preloading function scans the hyperlink queue for hyperlinks not

1 marked as loaded and directs the web browser to preload one or more webpages into a

2 webpage queue pointed to by such unmarked hyperlinks, if

3   (i) such webpages are not already in the process of being loaded by a different

4   type of look-ahead function, such as described in Figure 15 and Figure 19;

5   (ii) the Network bandwidth has not become saturated; and

6   (iii) the computer processor has not become saturated. These webpages are not

7   visible, but are immediately available to become visible and viewed upon

8   demand.

9 After directing the web browser to preload such webpages, the unmarked hyperlinks are

10 marked as loaded and the function waits a specified period of time before rescanning the

11 hyperlink queue and repeating the process.

12

13 Figure 19 depicts an IRDS directed, web browser look-ahead Descendant Webpage

14 Preloading, where the descendant webpages pointed to by hyperlinks that reside on

15 webpages that have already been preloaded into a webpage queue or computer memory,

16 whether or not visible, are preloaded into a webpage queue, computer memory, or other

17 web browser object. These descendant webpages are not visible until requested by the

18 web browser to be displayed on demand. A user selecting a hyperlink on a visible

19 webpage would immediately have the webpage associated with such hyperlink available

20 on demand and made visible in the web browser display.

21

22 Figure 20 shows a flowchart and diagram associated with selecting the number of

23 webpages to display at a given time.

24

25 Figure 21 shows a flowchart and diagram associated with selecting a webpage(s) in a

26 multi-page web browser display and changing the zoom factor for a selected webpage(s).

27

28 Figure 22 shows a diagram associated with selecting a webpage in a multi-page web

29 browser display and making the selected webpage encompass the entire screen area

30 allotted for the multi-page display, which is equivalent to setting the number of webpages

31 to display to one.

1

2 Figure 23 shows a diagram associated with changing from an IRDS enhanced web

3 browser mode to a conventional web browser mode for a selected webpage.

4

5 Figure 24 shows a diagram associated with selecting any portion of a web browser

6 display and creating an image in a standard image format, such as Joint Photography

7 Experts Group ("JPEG"), Graphics Interchange Format ("GIF"), or bitmapped ("BMP")

8 that can be saved to physical media (hard drive, floppy drive, compact disk, etc) or

9 computer memory or copied to another computer application, such as a word processor,

10 spread sheet, or presentation program.

11

12 Figure 25 shows a diagram associated with removing the selected webpages from the

13 multi-page web browser display and/or webpage queue and/or the associated hyperlinks

14 from the hyperlink queue.

15

16 Figure 26 shows a diagram associated with group bookmarking a selected set of

17 hyperlinks, where such set of hyperlinks can be recalled later and used to preload the

18 webpages pointed to by such hyperlinks into a webpage queue and subsequently

19 displayed by a web browser upon demand.

20

21 Figure 27 shows a diagram associated with selecting any portion of a webpage queue,

22 whether or not displayed by a web browser and saving such webpages to an alternate

23 webpage set or queue. One or more such alternate sets could be made the active display

24 set upon demand.

25

26 DETAILED DESCRIPTION OF THE INVENTION

27

28 Figure 1 shows a distributed Network environment for a conventional information search

29 utilizing a search engine and web browser on a computer. Here, a computer 101 including

30 a local web browser, is attached to the Internet 102 or possibly a more generalized

31 Network through a physical link 105. The physical link 105 may be wired, wireless, or an

1   optical link. The search engine contacted by the web browser is usually on another

2   computer 106 attached to the Internet 102, but it is possible that the search engine could

3   reside on the same computer 101 as the web browser. The search engine retrieves

4   applicable information from one or more databases 104 connected to a database server

5   computer 103 and returns a list of hyperlinks to the web browser. The database server

6   computer 103 and its databases 104 are usually connected through a private LAN 107 to

7   the search engine computer 106 to keep the databases themselves isolated from the

8   Internet for security purposes. However, it is possible that the database server computer

9   103 and its databases 104 are connected to the Internet or more generalized Network. It is

10   also possible that the databases 104 reside on or are directly connected to the search

11   engine computer 106. When computer and Network bandwidth were limited, databases

12   tended to be local to a computer or on a mainframe computer accessed through terminals.

13   With the advent of fast processing and high Network throughput, databases tend to be

14   distributed on a Network to allow for the greatest access and flexibility.

15

16   Figure 2 shows a typical prior art search engine display in a web browser 201 after

17   executing a web search, which may contain any portion or combination of the following:

18   an input box 202 for the user's search topic; commands 203 and 207 to execute a search

19   on the web, search for images 208, search group listings 209, search directory listings

20   210, search and go directly 216 to the first website in the hyperlink list; hyperlinks to

21   select the next hyperlink set 217, the previous hyperlink set 218, or a particular hyperlink

22   set 219; hyperlink to advanced search options 206; hyperlink to user preferences 211;

23   hyperlinks 213 to related topics; hyperlinks 215 to unrelated topics; hyperlinks 204 to

24   webpages that the search engine has returned for a particular topic; a text description 205

25   for each hyperlink 204; statistics 212 for the results returned that may include the number

26   of hyperlinks found for the associated search topic, the amount of time to execute the

27   search, and which set of hyperlinks is currently displayed; and hyperlinks 214 to

28   webpages related to advertisements. This conventional search paradigm returns lists of

29   hyperlinks that are prioritized in relationship to the search topic. To view the actual

30   webpage pointed to by the hyperlink, the hyperlink is selected and the web browser

1   contacts the website that is managing the webpage and the web browser subsequently

2   downloads the webpage to the web browser, if the webpage is available.

3

4   Figure 3 shows a typical prior art search engine display in a web browser 301 after

5   executing a search for images, which may contain any portion or combination of the

6   following: an input box 302 for the user's search topic; commands to execute a search

7   303, 307 on the web, search for images 308, search group listings 309, search directory

8   listings 310, search and go 316 directly to the first website in the hyperlink list;

9   hyperlinks to select the next hyperlink set 317, the previous hyperlink set 318, or a

10   particular hyperlink set 319; hyperlink to advanced search options 306; hyperlink to user

11   preferences 311; hyperlinks 313 to related topics; hyperlinks 315 to unrelated topics;

12   thumbnail images 304 with hyperlinks to webpages that were returned by a search

13   engine(s) for a particular topic; a text description 305 for each thumbnail image 304;

14   statistics 312 for the results returned that may include the number of hyperlinks found for

15   the associated search topic, the amount of time to execute the search, and which

16   hyperlink set is currently displayed; and hyperlinks 314 to webpages related to

17   advertisements. This conventional search paradigm returns lists of thumbnail images that

18   are images that can themselves be selected, such as by clicking the image with a

19   computer Mouse, to act as hyperlinks. These thumbnail image hyperlinks are prioritized

20   in relationship to the search topic. To view the actual webpage pointed to by the

21   thumbnail image hyperlink, the thumbnail image hyperlink is selected and the web

22   browser contacts the website that is managing the webpage and the web browser

23   subsequently downloads the webpage to the web browser, if the webpage is available.

24

25   Figure 4 shows a flow chart for a possible sequence of events for a conventional

26   information search utilizing a web browser on a computer and a search engine in a

27   Networked environment. A web browser is opened 401 on a computer and the user

28   browses 402 to a search engine website and inputs 403 the search topic and any options

29   or constraints into the search engine webpage and executes 404 the search. The search

30   engine returns 405 a limited list of hyperlinks, usually on the order of 10-20 hyperlinks.

31   The user may review 406 the hyperlinks, descriptions, and any accompanying thumbnail

1   images, then select 407 a desired hyperlink. The web browser downloads the webpage

2   associated with the hyperlink, if the webpage is available. The user reviews 408 the

3   webpage information and may

4   (i) return 409 to the search engine webpage to continue to review the list of

5   hyperlinks 406 and select 407 another hyperlink from the hyperlink list to browse

6   to another webpage; or

7   (ii) return 409 to the search engine webpage and input 403 a new search topic and

8   any options or constraints into the search engine webpage and execute 404 a new

9   search.

10   This ping-pong process between the search engine website and the websites associated

11   with the hyperlinks returned from the search engine is continued until the user has found

12   the sought after information or halts the search 410.

13

14   Figure 5 shows a prior art web browser display 501 incorporating a loosely integrated

15   search capability, after a search has been executed. The web browser display may contain

16   any portion or combination of the following: an input box 502 for the user's search topic;

17   command 503 to execute a search; hyperlinks to select the next hyperlink set 506 or the

18   previous hyperlink set 505; hyperlink to advanced search options 508; hyperlink to

19   information regarding the results 509 of the search; hyperlink to help 510; hyperlinks 504

20   to webpages that the search engine has returned for a particular topic; and a selection box

21   507 to select an alternate search engine. The user isn't required to browse to the search

22   engine website to input criteria, execute a search, or review the resultant hyperlinks. The

23   list of hyperlinks returned by the search engine, such as Internet Explorer, is capable of

24   displaying both a text hyperlink list 504 in one panel of the web browser and thumbnail

25   images 512 with hyperlinks and image locations 511 in a second panel. Selecting a text

26   504 hyperlink or a thumbnail image 512 representing a hyperlink, instructs the web

27   browser to open the webpage associated with the hyperlink, if the webpage is available.

28   The second panel is then replaced with such webpage. The text hyperlink list 504 remains

29   in the left panel.

30

1   Figure 6 shows a flow chart for a possible sequence of events for a conventional

2   information search utilizing a web browser incorporating a loosely integrated search

3   capability on a computer in a Networked environment. Specifically, a web browser is

4   opened 601 on a computer and the user inputs 602 the search topic and any options or

5   constraints and execute 603 a search. The search engine returns a limited list of

6   hyperlinks to the web browser, usually on the order of 10-20 hyperlinks. The user

7   reviews 604 the hyperlinks, descriptions, and any accompanying thumbnail images and

8   selects 605 a desired hyperlink. The web browser opens the webpage associated with the

9   hyperlink, if the webpage is available. The user reviews 606 the information on the

10   webpage and may

11   (i) continue to review 604 the list of hyperlinks and select 605 another hyperlink

12   from the hyperlink list to open another webpage; or

13   (ii) input 602 a new search topic and any options or constraints into the web

14   browser and execute 603 a new search; or

15   (iii) terminate 607 the search.

16

17   Figure 7 shows a flowchart for a possible sequence of events for loading a webpage into a

18   conventional web browser 707. Specifically, the web browser requests 701 a webpage. If

19   the web browser has an active cache 709 memory, the cache 709 is checked 702 by the

20   web browser for a valid webpage. If the webpage is valid, the web browser displays 708

21   the webpage. If the web browser's 707 cache 709 isn't active or a valid webpage isn't

22   available in cache 709 memory, the web browser contacts 703 the website associated

23   with the webpage and requests 704 the webpage. After a period of time 705, which

24   includes the website and Network latency, the webpage if available, is returned 706 to the

25   web browser 707 for display 708. Even though a web browser may have multiple

26   concurrent connections to a particular webpage to load elements from such webpage, this

27   aforementioned serial cycle is inherent for loading each successive webpage. Therefore,

28   the latency 705 or wasted time is additive for each webpage loaded by the conventional

29   web browser 707.

30

1　　Figure 8 shows possible levels of IRDS integration, according to the present invention,

2　　with a conventional web browser including

3　　　　　　(i) a fully integrated IRDS and web browser 806 that can be executed and

4　　　　　　displayed on a computer 807;

5　　　　　　(ii) an IRDS add-on 801 to a web browser 805, where the IRDS program(s) 803

6　　　　　　and any data 802 required, are separate from the web browser 805 and its data

7　　　　　　store. The IRDS add-on 801 communicates with the web browser 805 and any

8　　　　　　output is displayed on the local computer 804. Both the IRDS add-on 801 and

9　　　　　　web browser 805 are executed on the local computer 804; or

10　　　　　(iii) an IRDS add-on 801, distributed on a Network 810 and residing on a

11　　　　　different computer 804 than the web browser. The IRDS add-on 801

12　　　　　communicates with the web browser 808 residing on computer 809. Any output is

13　　　　　displayed on the web browser computer 809.

14　　A client-server relationship is also possible, where a computer terminal 811 does not

15　　execute any programs, but displays and controls the execution of

16　　　　　(i) a web browser 805 or a web browser 808 working in conjunction with an

17　　　　　IRDS add-on 801; or

18　　　　　(ii) a fully integrated IRDS enhanced web browser 806.

19

20　　Figure 9 shows an IRDS enhanced web browser 901 display 902 that contains function

21　　grouping 904 that includes command, control, and status. Features to be described enable

22　　search, display, and review of Network based information in a fast efficient manner.

23　　Inputs may be entered in the web browser display 902, a web browser generated window,

24　　and/or a webpage loaded into the web browser. Inputs may include: a search topic 908;

25　　search options or constraints 909; search engine selection 922; concurrent webpage

26　　loading (concurrent means performing multiple actions at nearly the same time without

27　　waiting for a prior action to complete) and look-ahead webpage preloading control 910;

28　　initiate search execution 923; select number of webpages to be display simultaneously

29　　920; change the multiple webpage display to the one webpage currently selected 906;

30　　group bookmark options 907 for any portion of a hyperlink queue; setting the users

31　　homepage 918 to a selected webpage; removing 913 a webpage or multiple webpages

1   from the web browser display and/or the webpage queue and/or the associated hyperlinks

2   from the hyperlink queue; displaying the next set 917 of webpages; displaying the

3   previous set 916 of webpages; displaying the first set 914 of webpages; displaying the

4   last set 915 of webpages; zooming 911 in or out on a selected webpage(s) or any portion

5   thereof; finding and highlighting 912 the search topic on the webpages currently

6   displayed; creating an image 924 of a selected portion of a web browser display;

7   switching 905 from IRDS enhanced mode to conventional web browser mode and browse

8   to the selected webpage; and list 921 the current hyperlink queue and upon selection of

9   one or more hyperlinks then display the associated webpages. Outputs may include the

10   fully active webpage display 903 and status information 919 including but not limited to:

11   number of webpages preloaded, total number of webpages that match the search topic

12   criteria, processor utilization, network utilization, memory utilization, and current set of

13   webpages displayed.

14

15   Figure 10 shows an IRDS enhanced web browser 1001 including display 1002 containing

16   function grouping 1004 that further includes command, control, and status for a web

17   browser and features as enumerated in Figure 9. Also included are two (2) fully active

18   webpages 1003 and 1005 that are displayed concurrently. No conventional web browser

19   displays multiple webpages simultaneously from a list of hyperlinks returned by a search

20   engine.

21

22   Figure 11 shows an IRDS enhanced web browser 1101 including display 1102 containing

23   function grouping 1104 that further includes command, control, and status for a web

24   browser and features as enumerated in Figure 9. Also included are four (4) fully active

25   webpages 1103, 1105, 1106, and 1107 that are displayed concurrently. Again, no

26   conventional web browser displays multiple webpages simultaneously from a list of

27   hyperlinks returned by a search engine.

28

29   Figure 12 shows an IRDS enhanced web browser 1201 including display 1202 containing

30   function grouping 1204 that further includes command, control, and status for a web

31   browser and features as enumerated in Figure 9. Also included are nine (9) fully active

1   webpages 1203, 1205, 1206, 1207, 1208, 1209, 1210, 1211, and 1212 that are displayed

2   concurrently. Depending on the display monitor screen size and resolution, various

3   numbers and configurations of simultaneous webpage displays can be implemented with

4   the IRDS paradigm described herein.

5

6   Figure 13 shows a flowchart for a possible sequence of events for an information search

7   in a Networked environment utilizing an IRDS enhanced web browser. Specifically, the

8   IRDS enhanced web browser is opened 1301 on a computer and the user inputs 1302 the

9   search topic and any options or constraints into the IRDS command and control center

10   and starts a search. The IRDS contacts one or more selected search engines and executes

11   1303 searches on each search engine with the appropriate grammar for each search

12   engine. The IRDS reads and parses 1304 each data stream returned from each search

13   engine and extracts 1305 the lists of hyperlinks from the data streams and prioritizes the

14   hyperlinks, and instructs the web browser to concurrently preload 1306 a number of the

15   webpages pointed to by such hyperlinks. One or more webpages, depending on the

16   display control, and status are displayed 1307 in the web browser simultaneously. The

17   user may review 1308 any displayed webpage or select 1309 another webpage or group

18   of webpages to display. After completing such review, the user can halt the search

19   process 1310, start a new search 1302, or select other webpages 1309 to review.

20

21   Figure 14 shows the IRDS directing a web browser 1406 to concurrently preload multiple

22   webpages 1401, 1402, 1403, 1404, and 1405 into the web browser 1406. If a valid

23   webpage already exists in the web browser cache 1409--if the cache is available--then the

24   web browser loads the webpage from the cache; otherwise the web browser starts a

25   preload cycle from the Network for each webpage. By concurrently preloading the

26   webpages into the web browser, the Latency to preload multiple webpages is not

27   additive, as in the conventional web browser serial loading case of Figure 7. Each preload

28   cycle in Figure 14 has its own independent thread and will not hold-up other threads

29   while it completes. As many webpages can be preloaded at the same time and only a few

30   are displayed 1407 simultaneously, most of the webpages 1408 are held in a webpage

1   queue, waiting to be displayed. When the user selects another webpage that has been

2   preloaded, it is immediately available for display in the web browser.

3

4   Figure 15 shows a flowchart for a possible sequence of events for Next-In-Queue

5   Webpage Preloading and a diagram depicting an IRDS enhanced web browser display of

6   two (2) fully active and simultaneously displayed webpages 1507 and a webpage queue.

7   Next-In-Queue Webpage Preloading refers to a method where IRDS directs a web

8   browser to preload the next webpage or webpages into a webpage queue. The web

9   browser loads such webpages from hyperlinks that point to these webpages. These

10   hyperlinks are in their own queue. Specifically, an IRDS enhanced web browser requests

11   1501 the next webpages in the webpage queue for display. The number of webpages

12   requested from the webpage queue depends on and is the same as the number of

13   webpages currently displayed. In this example, two (2) webpages 1507 are currently

14   displayed and the next two (2) webpages 1508 in the webpage queue are requested 1501.

15   If the webpages are not preloaded 1502 in the webpage queue, then the hyperlinks

16   pointing to these webpages are utilized to load 1503 such webpages into the webpage

17   queue. After the webpages are loaded 1503 into the webpage queue or if the webpages

18   are already preloaded 1502 in the webpage queue, then the currently displayed webpages

19   1507 are made not visible 1504 and the next two (2) webpages 1508 in the webpage

20   queue are made visible 1505. The following two (2) webpages 1509 thereafter are then

21   preloaded 1506 and not visible. The number of webpages 1509 to preload 1506 is

22   governed by the number of webpages to display on the lower bound, such that immediate

23   display of such webpages by the web browser is possible upon demand, and available

24   Network and processor bandwidth on the upper bound. Loaded and preloaded in the

25   foregoing context can mean that the webpage and its constituent parts

26   (i) have been fully downloaded from a Network, computer storage or memory;

27   (ii) have been partially downloaded from a Network, computer storage or

28   memory;

29   (iii) are in the process of being downloaded from a Network, computer storage or

30   memory; and

31   (iv) any combination of (ii) and (iii).

1

2   Figure 16 shows a flowchart for a possible sequence of events for Periodic Webpage

3   Preloading. After a search on a Network has been initiated through an IRDS enhanced

4   web browser, a list of hyperlinks to webpages may be returned from each search engine

5   utilized and put into a hyperlink queue 1601. These hyperlinks point to webpages that

6   may be distributed on a Network and may be on multiple websites. Periodic Webpage

7   Preloading refers to a method where IRDS periodically searches the webpage queue for

8   locations that have old, inconsistent, or no data 1604. Upon finding an unloaded position

9   1604 in the webpage queue, the web browser is directed to preload 1605 one or more

10   webpages to take advantage of this available memory. Such webpages are not visible,

11   until the web browser needs to display the webpages. Specifically, after the hyperlink

12   queue has been populated 1601 with the hyperlinks returned from the search engine(s), a

13   set period of time is waited 1602 and then a position pointer in the webpage queue is

14   incremented 1603. The new position 1604 in the webpage queue is checked for old

15   webpage data, inconsistent webpage data, or no webpage data. If the webpage in the

16   webpage queue has been preloaded and is the correct webpage pointed to by the

17   associated hyperlink in the hyperlink queue, then the position pointer 1603 is

18   incremented and the next position 1604 checked. If the webpage 1604 in the webpage

19   queue hasn't been loaded or isn't the correct webpage pointed to by the associated

20   hyperlink in the hyperlink queue, the web browser utilizes the hyperlink in the hyperlink

21   queue to preload the webpage 1605 into the webpage queue. This process goes to sleep

22   for a set period of time 1602 and then repeats. If at any time, the end of the webpage

23   queue is reached, the process is temporarily halted 1606. The waiting period and the

24   number of webpages preloaded on each repetition can be adjusted according to available

25   Network and processor bandwidth. The preloading process should not be detrimental to

26   the user interacting with the currently displayed webpages.

27

28   Figure 17 shows a flowchart for a possible sequence of events for Periodic Webpage

29   Preloading with loading collision avoidance. After a search on a Network has been

30   initiated through an IRDS enhanced web browser, a list of hyperlinks to webpages may

31   be returned from each search engine utilized and put into a hyperlink queue 1701. These

1   hyperlinks point to webpages that may be distributed on a Network and may be on

2   multiple websites. Periodic Webpage Preloading with loading collision avoidance refers

3   to a method where IRDS periodically searches the webpage queue for locations that

4   (i) have old, inconsistent, or no data 1704; and

5   (ii) are not being preloaded 1705 by another method.

6   Upon finding such an unloaded position in the webpage queue, the web browser is

7   directed to preload 1706 one or more webpages. Such webpages are not visible, until the

8   web browser needs to display the webpages. Specifically, after the hyperlink queue 1701

9   has been populated with the hyperlinks returned from the search engine(s), a set period of

10   time is waited 1702 and then a position pointer in the webpage queue is incremented

11   1703. The new position 1704 in the webpage queue is checked for old webpage data,

12   inconsistent webpage data, or no webpage data. If the webpage in the webpage queue has

13   been preloaded and is the correct webpage pointed to by the associated hyperlink in the

14   hyperlink queue, then the position pointer 1703 is incremented and the next position 1704

15   checked. If the webpage 1704 in the webpage queue hasn't been loaded or isn't the

16   correct webpage pointed to by the associated hyperlink in the hyperlink queue and isn't in

17   the process of being preloaded 1705 by another method, the web browser utilizes the

18   hyperlink in the hyperlink queue to preload 1706 the webpage into the webpage queue.

19   The process then goes to sleep for a set period of time 1702 and then repeats. If there is a

20   preloading 1705 conflict, the process goes to sleep for a set period of time 1702 and then

21   repeats. If at any time, the end of the webpage queue is reached, the process is

22   temporarily halted 1707. The waiting period and the number of webpages preloaded on

23   each repetition can be adjusted according to available Network and processor bandwidth.

24   The preloading process should not be detrimental to the user interacting with the

25   currently displayed webpages.

26

27   Figure 18 shows a flowchart for a possible sequence of events for Periodic Webpage

28   Preloading with network and processor saturation avoidance. After a search on a Network

29   has been initiated through an IRDS enhanced web browser, a list of hyperlinks to

30   webpages may be returned from each search engine utilized and put into a hyperlink

31   queue 1801. These hyperlinks point to webpages that may be distributed on a Network

1   and may be on multiple websites. Periodic Webpage Preloading with network and

2   processor saturation avoidance refers to a method where IRDS periodically searches the

3   webpage queue for locations

4   (i) that have old, inconsistent data, or no data 1804;

5   (ii) that are not being preloaded 1805 by another method;

6   (iii) when the network connection 1806 isn't saturated; and

7   (iv) when the computer processor 1807 local to the web browser isn't saturated.

8   Upon finding such an unloaded position in the webpage queue, the web browser is

9   directed to preload 1808 one or more webpages. Such webpages are not visible, until the

10   web browser needs to display the webpages. Specifically, after the hyperlink queue 1801

11   has been populated with the hyperlinks returned from the search engine(s), a set period of

12   time is waited 1802 and then a position pointer in the webpage queue is incremented

13   1803. The new position 1804 in the webpage queue is checked for old webpage data,

14   inconsistent webpage data, or no webpage data. If the webpage in the webpage queue has

15   been preloaded and is the correct webpage pointed to by the associated hyperlink in the

16   hyperlink queue, then the position pointer 1803 is incremented and the next position 1804

17   checked. If a webpage 1804 in the webpage queue hasn't been preloaded or isn't the

18   correct webpage pointed to by the associated hyperlink in the hyperlink queue and isn't in

19   the process of being preloaded 1805 by another method and the network 1806 isn't

20   saturated and computer processor 1807 local to the web browser isn't saturated, then the

21   web browser utilizes the hyperlink in the hyperlink queue to preload 1808 the webpage

22   into the webpage queue. The process then goes to sleep for a set period of time 1802 and

23   then repeats. If there is a preloading 1805 conflict or the network connection 1806 is

24   saturated or the processor 1807 is saturated, the process goes to sleep for a set period of

25   time 1802 and then repeats. If at any time, the end of the webpage queue is reached, the

26   process is temporarily halted 1809. The waiting period and the number of webpages

27   preloaded on each repetition can be adjusted according to available Network and

28   processor bandwidth. The preloading process should not be detrimental to the user

29   interacting with the currently displayed webpages.

30

1   Figure 19 depicts an IRDS directed web browser Descendant Webpage Preloading

2   method. Descendant pages 1906, 1907, and 1908 are pointed to by hyperlinks 1903,

3   1904, and 1905 respectively that reside on webpages that have already been preloaded

4   into a webpage queue 1902 or computer memory. Descendant pages are preloaded into

5   computer memory, a queue, or web browser 1901 objects that are not visible until

6   requested by the web browser 1901 to be displayed on demand. A user selecting

7   hyperlink 1903, 1904, or 1905 on a visible webpage would immediately have the

8   descendant webpage 1906, 1907, or 1908 associated with such hyperlink 1903, 1904, or

9   1905 available and displayed.

10

11   Figure 20 shows a flowchart and diagram for an IRDS enhanced web browser 2001

12   display function that is able to change the number of webpages 2005 displayed at a given

13   time. The web browser 2001 command and control function 2002 includes icon 2003 that

14   is selected 2004, or alternatively operated by rotating the computer Mouse wheel 2008

15   over icon 2003 to change the number of webpages 2005 displayed to a new preset

16   number of webpages 2006. The Mouse wheel may be continually rotated or the icon

17   continually reselected until the number of webpages displayed is satisfactory 2009,

18   within the limitations of the number of display setting possibilities. In this example, the

19   number of webpages displayed 2005 is changed from two (2) to four (4) webpages

20   displayed 2006. The webpages, two 2005 or four 2006, are displayed simultaneously and

21   are fully active webpages, that may be from different website domains. The icon 2003

22   may change appearance 2007 to indicate the current number of webpages displayed.

23

24   Figure 21 shows a flowchart and diagram for an IRDS enhanced web browser 2101

25   including a zoom function to zoom in or out on any selected 2108 displayed webpage

26   2105 or group of webpages. The web browser 2101 command and control function 2102

27   includes zoom icon 2103 that is selected 2104, or alternatively operated by rotating the

28   computer Mouse wheel 2109 over such icon 2103 to change the zoom factor for selected

29   2108 webpages 2105 displayed to a new zoom factor. The Mouse wheel may be

30   continually rotated 2109 or the icon 2103 continually reselected 2109 until the zoom

31   factor for the webpages 2106 displayed is satisfactory 2110, within the limitations of the

1 number of display setting possibilities. In this example, the zoom factor for the selected

2 webpage 2105 displayed is changed to zoom in and the resultant webpage 2106

3 displayed. The zoomed in webpage 2106 is displayed simultaneously with any non-

4 zoomed webpages displayed and all displayed webpages are fully active webpages that

5 may be from different website domains. The icon 2103 may change appearance 2107 to

6 indicate the current zoom factor for the zoomed webpages 2106 displayed.

7

8 Figure 22 shows a diagram for an IRDS enhanced multi-page web browser 2201 full

9 display function 2203 to make the selected webpage 2205 encompass the entire screen

10 area allotted for the multi-page display, which is equivalent to setting the number of

11 website pages to display to one for such selected webpage 2205. Specifically, a webpage

12 2205 is selected from the all the webpages displayed and then the web browser 2201

13 command and control 2202 full display function 2203 is selected with a computer Mouse

14 2204 or other input device. The resultant webpage 2206 is displayed in the entire screen

15 area allotted for the multi-page display.

16

17 Figure 23 shows a diagram for an IRDS enhanced multi-page web browser 2301 mode

18 function 2303 to make the selected webpage 2305 encompass the entire screen area

19 allotted for the multi-page display and switch from an IRDS enhanced mode to a

20 conventional web browser mode that displays and operates on one (1) webpage at a time.

21 The mode function will switch between conventional web browser mode and IRDS

22 enhanced web browser mode on each reselection. Specifically, a webpage 2305 is

23 selected from the all the webpages displayed and then the web browser 2301 command

24 and control 2302 mode function 2303 is selected 2304 with a computer Mouse or other

25 input device. The resultant webpage 2306 is displayed in the entire screen area allotted

26 for the multi-page display and has switched to a conventional web browser mode. The

27 web browser icons and command and control display will change appearance accordingly

28 to show the current web browser mode and available features and functions in such

29 mode.

30

1   Figure 24 shows a diagram for an IRDS enhanced multi-page web browser 2401 imaging

2   function 2403 that takes a selected portion 2405 of a web browser display and creates an

3   image 2406 in a standard image format, such as Joint Photography Experts Group

4   ("JPEG"), Graphics Interchange Format ("GIF"), or bitmapped ("BMP"). The selected

5   portion of the web browser display can be any portion of the web browser display

6   including, but not limited to, crossing multiple webpage display boundaries. Specifically,

7   a portion 2405 of a web browser display is selected and then the web browser 2401

8   command and control 2402 imaging function 2403 is selected 2404 with a computer

9   Mouse or other input device. The created image 2406 may be displayed and/or saved as a

10   file to physical media (hard drive, floppy drive, compact disk, etc) or computer memory

11   or copied to another computer application, such as a word processor, spreadsheet, or

12   presentation program.

13

14   Figure 25 shows a diagram for an IRDS enhanced multi-page web browser 2501 remove

15   webpage function 2503 to remove selected 2505 webpages from the multi-page display

16   and/or webpage queue 2509 and/or the associated hyperlinks from the hyperlink queue.

17   Specifically, a webpage(s) 2505 is selected from the displayed webpages. The web

18   browser 2501 command and control 2502 remove webpage function 2503 is selected with

19   a computer Mouse 2504 or other input device. The resultant web browser display

20   replaces the selected webpage 2505 with the webpage 2506 immediately following in the

21   webpage queue. All webpages in the webpage queue following the removed webpage

22   2505 are decremented one position, such that webpage n+2 moves into webpage n+1's

23   display position and webpage n+3 moves into webpage n+2's display position and

24   webpage n+4 moves into webpage n+3's display position. Any displayed webpages will

25   immediately reflect the new webpage queue ordering. Alternately, a webpage from the

26   webpage queue may replace the deleted page or the deleted page may be left blank, while

27   the other webpages currently displayed may stay in their current positions.

28

29   Figure 26 shows a diagram for an IRDS enhanced multi-page web browser 2601 group

30   bookmarking function 2603 to bookmark selected hyperlinks 2605 or all the hyperlinks

31   from the hyperlink queue. A conventional web browser allows a hyperlinked bookmark

1   to be saved for one (1) webpage at a time. An IRDS enhancement would allow multiple

2   hyperlinks 2605 associated with a hyperlink queue to be saved as a group bookmark

3   2606. This group bookmark 2606 could be recalled later to reload the hyperlink queue

4   and subsequently reload the associated webpages into the webpage queue. This would

5   retrieve and display an updated state of a search without performing a search. Hence, if

6   the associated webpages had changed between an initial search and recalling the

7   webpages with a group bookmark reload, the recalled version would reflect any updated

8   webpage information. Specifically, hyperlinks 2605 from a hyperlink queue or portion

9   thereof is selected and then the web browser 2601 command and control 2602 group

10   bookmark function 2603 is selected with a computer Mouse 2604 or other input device.

11   These selected hyperlinks 2605 are saved as a group bookmark 2606. This group

12   bookmark 2606 can be recalled later to reload the hyperlink queue and subsequently

13   reload the associated webpages into the webpage queue for web browser display.

14

15   Figure 27 shows a diagram associated with selecting any portion of a webpage queue

16   2701, whether or not displayed by an IRDS enhanced web browser and saving such

17   webpages to an alternate webpage set 2702 or queue. One or more such alternate sets

18   2702 could be made the active display set upon demand. During an information search

19   and review process it would be advantageous to move selected pages to an alternate set

20   for later review or group bookmarking. In this way, multiple searches could take place

21   and only the useful webpages kept for review. Multiple alternate sets or queues would be

22   available to enable grouping of selected webpages from multiple searches into like

23   categories or by criteria set by the user. Group bookmarking would be available for each

24   alternate set or queue.

25

26

1   *****

2

3   Therefore, methods and apparatus for implementing an Information Retrieval and

4   Display System, have been described.

5

6   It should be understood that the particular embodiments described above are only

7   illustrative of the principles of the present invention, and various modifications could be

8   made by those skilled in the art without departing from the scope and spirit of the

9   invention. Thus, the scope of the present invention is limited only by the claims that

10   follow.

11

12

"Information Retrieval and Display System"
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